



**SITE INSPECTION SAMPLING PLAN  
FOR THE  
MILLER CHEMICAL AND FERTILIZER  
COMPANY  
(MD-123)  
Whiteford, Maryland**

**January 2001**

**Prepared by:** Maryland Department of the Environment  
Waste Management Administration  
Site and Brownfields Assessments/State Superfund Division  
2500 Broening Highway  
Baltimore, Maryland 21224-6617

**Prepared for:** U.S. Environmental Protection Agency  
Region III  
1650 Arch Street  
Philadelphia, Pennsylvania 19103-2029

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## **1.0 Introduction**

Under the authority of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) and the Superfund Amendments and Reauthorization Act of 1986, the Maryland Department of the Environment (MDE), Waste Management Administration will conduct a Site Inspection at the Miller Chemical and Fertilizer Company site in Whiteford, Harford County, Maryland. The purpose of the Expanded Site Inspection is to further characterize the contamination of the filled pond area and the impact of contamination on groundwater, surface water, soil and sediment in the vicinity. The scope of the investigation will include collecting samples of on-site groundwater, surface water, soil and sediment, as well as collecting off-site surface water and sediment samples to determine if contamination has migrated off site.

This sampling proposal is submitted to the U.S. Environmental Protection Agency (EPA) by the MDE's Environmental Restoration and Redevelopment Program, Site and Brownfields Assessments/State Superfund Division.

## **2.0 Site Description**

The 15.5-acre Miller Chemical and Fertilizer Company site is located at 2425 Whiteford Road in Whiteford, Harford County, Maryland. The site is situated to east of the railroad tracks, adjacent to the Whiteford Packing Plant. The facility is bounded on the west by MD Route 165, to the south by Whiteford Road (MD Route 136) and to the north by an unnamed stream. The company's parking lots and buildings occupy the southern portion of the property. The Whiteford area is known for Green Marble, which contains high amounts of chromium and may contribute to higher than normal background levels of chromium on this site.

In 1958, Miller Chemical and Fertilizer Company purchased and installed equipment to mix dry chemical components to produce herbicides and fungicides. The ingredients of these products included arsenic, copper, chromium, and zinc. Miller Chemical reported that organic chemicals were not used in this process. The production of these products was dry process but the mixing tanks were occasionally rinsed with water, which was then discharged to a pond area on the site. The production began in 1963 and ended in 1965. All equipment was removed by 1968. These products were sold under the names 658-Fungicide and Kill-all. On-site waste disposal ceased in 1976. The building where these products were manufactured was located on the southern portion of the site near the plant building. 2,4-Dichlorophenoxyacetic Acid (2,4-D) was also blended on the northern portion of the site near the filled pond area and adjacent to the stream. The only on-site byproduct of this process was the empty drums of 2,4-D, which were resold.

The Whiteford Packing Company located adjacent to the site also allowed their discharge to flow into the Miller Chemical and Fertilizer Company ponds. In 1983, almost constant overflow from Whiteford Packing Company still ran across the Miller site and provided the only source of surface water to the site.

In September 1981, the waste ponds were drained and the land was graded to natural contours. The demolition material from the 2,4-D processing building was used as fill in one pond. The

water from the ponds was drained into the nearby stream. The natural contours of the land were preserved during reclamation. The filled pond area was designated a non-disturb area and a deed restriction was placed on this portion of the property restricting it to industrial use.

Because a Controlled Hazardous Substances (CHS) Facility Permit was no longer required for the discharge of hazardous waste into the lagoons, the Maryland Department of Health and Mental Hygiene revoked Miller Chemical and Fertilizer Company's hazardous waste permit A-015 in September 1982.

### **3.0 Previous Studies**

On June 22, 1983 NUS Corporation conducted a site inspection and sampling event and completed a *Field Trip Report for Miller Chemical and Fertilizer Corporation* and an *Addendum to Final Field Trip Report for Miller Chemical and Fertilizer* for the EPA in 1985. The field trip report summarized a site inspection, which included dioxin (2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)) screening and historical information. Analysis of samples revealed dioxin contamination in the area of the background samples taken off-site, north of the 2,4-D handling building. This was confirmed by analysis of the samples by a second laboratory. Also found in the area of the 2,4-D handling building were two semi-buried concrete vaults containing explosives. The addendum provided an analysis of priority pollutant sampling and concludes that sediments downstream of the site have elevated levels of arsenic, lead, and polynuclear aromatic compounds (PAHs).

On October 18, 1983 NUS Corporation conducted a site visit and sampling event and completed *A Field Trip Report for Miller Chemical and Fertilizer Company* for the EPA in 1984. The report provided a Phase II investigation of the extent of known 2,3,7,8-TCDD contamination adjacent to the site. The contamination was found to be very localized with a maximum concentration of 1.76 parts per billion, which was well below standards for industrial use and the Department of Health and Human Services determined that it would not present a risk human health.

### **4.0 Sample Collection Proposal**

Samples are proposed for collection from the groundwater, surface water, sediment and soil on site, and surface water, sediment, and soil off site. These samples will be collected and submitted for analysis in accordance with the EPA's Contract Laboratory Program (CLP) Routine Analytic Services. The samples will be analyzed for both Target Analyte List for inorganics and Target Compound List for organics. All samples will be collected in four sample matrices: one organic aqueous, one organic solid, one inorganic aqueous and one inorganic solid.

CLP protocol will be followed throughout the sample collection and submittal process (U.S. EPA, "Users Guide to CLP" December 1988). The quality control used by MDE includes the submittal of a field duplicate for each matrix, as defined above.

In addition, each matrix will also have one sample designated as the spike sample, which will be collected at specified additional volumes for CLP matrix spike quality control procedures.

The field blank will consist of deionized water provided by the Maryland Department of Health and Mental Hygiene Laboratory. The field blank will be transported in the field the day of sample collection and transferred to the appropriate sample containers. Should more than one day be required for sample collection, then samples will be shipped daily to the appropriate labs. Aqueous volatile organic compound analysis (VOA) trip blank samples will be included with each day's organic shipment. The trip blank consists of deionized water fixed with HCl and contained in VOA sample containers.

## **5.0 Groundwater Samples**

A total of five groundwater samples are proposed for the Miller Chemical and Fertilizer Company site. Groundwater samples in this sampling plan will be designated as GW# and will be collected using direct push (geoprobe) technology. GW1 will be collected in the northwestern portion of the filled pond area. GW2 will be collected in the southwestern portion of the filled pond area. GW3 will be collected in the eastern portion of the filled pond area near the drainage ditch. GW1, GW2, and GW3 will characterize the groundwater leaving the contaminated area. GW4 will serve as the background sample and will be collected upgradient of the waste source. GW5 will be the duplicate sample collected with GW3.

## **6.0 Surface Water and Sediment Samples**

A total of five surface water and seven sediment samples are proposed on and in the vicinity of the Miller Chemical and Fertilizer Company site. Aqueous surface water samples are designated as SW# and sediment samples are designated as SED# in this sampling plan. SW1 will be collected from the stream and will be located upstream of the drainage ditch to characterize the background surface water into which the on-site surface water is discharging. SW2 will be collected from the stream downstream of the drainage ditch to characterize surface water affected by on-site contamination. SW3 will be collected from the drainage ditch at the edge of the site to determine if contamination in off-site surface water discharging from the site via the drainage ditch. SW4 will be collected where the drainage ditch enters the stream to characterize the contamination entering the stream via surface water runoff collected in the drainage ditch. SW5 will be the duplicate of SW2. SED1 will be collected with SW1 and will represent the background sediment sample. SED2 will be collected with SW2. SED3 will be collected with SW3 and SED4 will be collected with SW4. SED5 will be collected from the drainage ditch entering the site near the railroad tracks to determine whether contamination is entering the site from Whiteford Packing. SED6 will be collected from the drainage ditch near the plant building to determine whether contamination is currently entering the filled pond area from the plant. SED7 will be the duplicate of sample collected with SED2.

## **7.0 Soil Samples**

A total of eleven soil samples are proposed for the Miller Chemical and Fertilizer Company site. Nine samples will be grab samples from the surface and two samples will be subsurface samples collected using direct push (geoprobe) methods. The samples will be collected from the former filled pond area to characterize contamination on the site. Soil samples for this sampling plan

will be designated as S#. Samples S1 (surface) and S2 (subsurface) will be collected with GW1 in the northwestern portion of the filled pond area. Samples S3 (surface) and S4 (subsurface) will be collected with GW2 in the southwestern portion of the filled pond area. S5 will be collected in the western portion of the filled pond area near the drainage ditch. Samples S6 (surface) and S7 (subsurface) will be collected with GW3 in the eastern portion of the filled pond area near the drainage ditch. S8 will be collected from the surface in the northeastern portion of the filled pond area. S9 will be collected from the surface in the southeastern portion of the filled pond area. S10 will be the duplicate of S6. S11 will serve as the background surface soil sample and will be collected with GW4.



# MARYLAND DEPARTMENT OF THE ENVIRONMENT

2500 Broening Highway • Baltimore, Maryland 21224

(410) 631-3000 • 1-800-633-6101 • [http:// www. mde. state. md. us](http://www.mde.state.md.us)

Parris N. Glendening  
Governor

October 20, 2000

Jane T. Nishida  
Secretary

Mr. William Wentworth  
Maryland Project Officer  
U.S. Environmental Protection Agency  
1650 Arch Street  
Philadelphia PA 19103-2029

Dear Mr. Wentworth:

On September 21, 2000, the Maryland Department of the Environment (MDE) and the Harford County Health Department met with the Whiteford Council, a local community interest group, to discuss concerns related to the former Miller Chemical site (MD-123). The group expressed some concern that waste left in an old impoundment, and additional material that they claim may have been buried nearby, may be contaminating community groundwater and impacting a stream that drains the area. After meeting with the group, MDE agreed to contact EPA to discuss additional investigation of the site in the next Cooperative Agreement.

Historically, the site was investigated by the State and EPA in the early 1980s pursuant to a discharge to a surface impoundment from a fungicide manufacturing building and to assess the potential for dioxin contamination from the mixing of 2,4-D. The impoundment was filled in, capped and covered by a deed restriction; the dioxin survey was negative except for a low detect in one background sample on an adjacent railroad line.

Due to the length of time since the site was surveyed and the allegations of additional disposal in pits near the restricted area, MDE is proposing an Expanded Site Investigation to address community concerns related to the groundwater and to determine if the institutional controls for the closed impoundment are still adequate to protect surface water and sediments downstream of the disposal area. Additional information concerning on-site disposal will be pursued as part of the investigation.

If you have any questions, please contact me at (410) 631-3493.

Sincerely,

Arthur O'Connell, Chief  
Site & Brownfields Assessments/State  
Superfund Division

AOC:cp

cc: Mr. Richard Collins  
Mr. Karl Kalbacher



**WandaF Johnson**

04/18/01 09:54 AM

To: Lorie Baker/R3/USEPA/US@EPA

cc:

Subject: Re: Please EXPEDITE SSID

The site id for Miller Chemical & Fertilizer Corp is "AD8".

The ORC account number for enforcement work is 01 T 03K 50103ERC A3D8PS00. The HSCD account number for PRP Search work is 01 T 03W 50103E A3D8NS00. The OPM account number for contracts management is 01 T 03J 50103E A3D8PS00.

Linda A. Baric  
Budget Analyst  
Office of the Comptroller - 3PM30  
215/814-5177 FAX 215/814-5233  
e-mail: baric.linda@epa.gov  
WandaF Johnson



**WandaF Johnson**

04/18/2001 08:28  
AM

To: Linda Baric/R3/USEPA/US@EPA

cc:

Subject: Please EXPEDITE SSID

Hi Linda. Pls. est. action codes rs, rv, la, qb, qc w/ prc 50102D for the site below.

Miller Chemical & Fertilizer Corp.  
Routes 136 & 135  
Whiteford, Harford County, MD 21160

Thx!

Wanda F. Johnson  
Region III  
Information Management Assistant (3HS33)  
(215) 814-3249



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION III  
1650 Arch Street  
Philadelphia, Pennsylvania 19103-2029

March 21, 2001

Arthur O'Connell  
Site and Brownfields Assessments/  
State Superfund Division  
Maryland Department of the Environment  
2500 Broening Highway  
Baltimore, MD 21224

RE: Site Inspection Sampling Plan for the  
Miller Chemical and Fertilizer Company

Dear Mr. O'Connell:

*I have reviewed the site inspection sampling plan for the Miller Chemical and Fertilizer Company located in Whiteford, Maryland. Based on my review and my phone conversation with you regarding this site, I am approving the sampling plan as written.*

However, there is one request I would like to make for future sampling plans that involve direct push methodologies. In the attached site safety plan, there are Standard Operating Procedures (SOP) for many various sampling techniques. I would like to request that you add an SOP for direct push sampling. The sampling protocol is important if this type of data is ever to be used for scoring a site for the National Priorities List (NPL).

Should you have any questions or concerns, please call me at (215) 814-3355.

Sincerely,

A handwritten signature in cursive script, appearing to read "Lorie Baker", is positioned above the typed name.

Lorie Baker  
Site Assessment Manager  
Region III

cc: Richelle Hanson  
✓ File

## 8.0 Sample Summary Table

Sample Identification	Sample Type	Sample Location	Rationale
GW1	Aqueous	Northwestern portion of the filled pond area.	Characterize on-site shallow groundwater discharging into nearby surface water.
SW1	Aqueous	Stream adjacent to site (upstream of drainage ditch)	Background for surface water.
S1	Soil	See GW1. Surface sample from northwestern portion of filled pond area. (spike)	Characterize on-site soil near contamination source.
SED1	Sediment	See SW1.	Background for sediment.
GW2	Aqueous	Southwestern portion of filled pond area (spike)	Characterize on-site shallow groundwater discharging into nearby surface water.
SW2	Aqueous	Stream adjacent to site (downstream of drainage ditch).	Characterize surface water affected by site contamination.
S2	Soil	See GW1. Subsurface sample.	Characterize subsurface soil in contaminated filled pond area.
SED2	Sediment	See SW2.	Characterize sediment affected by site contamination.
GW3	Aqueous	Eastern portion of the filled pond area near drainage ditch.	Characterize on-site shallow groundwater discharging into nearby surface water.
SW3	Aqueous	Drainage ditch at site boundary.	Characterize surface water discharge from the site via the drainage ditch.
S3	Soil	See GW2. Surface sample.	Characterize surface soil in contaminated filled pond area.
SED3	Sediment	See SW3.	Characterize sediment contaminated by surface water discharge via the drainage ditch.
GW4	Aqueous	Upgradient of the waste source.	Background for groundwater.
SW4	Aqueous	At the convergence of the drainage ditch and the stream.	Characterize the contamination entering the stream via surface water runoff.
S4	Soil	See GW2. Subsurface sample.	Characterize subsurface soil in contaminated filled pond area.
SED4	Sediment	See SW4.	Characterize sediment contamination in the stream from surface water runoff via the ditch.
GW5	Aqueous	See GW3.	<i>Duplicate of GW3.</i>
SW5	Aqueous	See SW2.	<i>Duplicate of SW2.</i>
S5	Soil	Western portion of the filled pond area near the drainage ditch.	Characterize surface soil in contaminated filled pond area.
SED5	Sediment	Drainage ditch near railroad tracks on eastern boundary of site.	Determine whether contamination is migrating on-site from Whiteford Packing.
S6	Soil	See GW3. Surface sample.	Characterize surface soil in contaminated filled pond area.
SED6	Sediment	Drainage ditch near packing plant.	Determine whether contamination is currently entering the filled pond area from the plant.
S7	Soil	See GW3. Subsurface sample.	Characterize subsurface soil in contaminated filled pond area.
SED7	Sediment	See SED2.	<i>Duplicate of SED2.</i>
S8	Soil	Surface soil from northeastern portion of the filled pond area.	Characterize surface soil in contaminated filled pond area.
S9	Soil	Surface soil from southeastern portion of the filled pond area.	Characterize surface soil in contaminated filled pond area.
S10	Soil	See S6.	<i>Duplicate of S6.</i>
S11	Soil	See GW4. Surface sample.	Background soil sample.

Sample Notes: Describe all soils in sample logs. Groundwater is expected to be very shallow at all boring locations.

## **9.0 Figures (See Appendix A)**

Figure 1 Topographic Map

Figure 2 Site/Sampling Sketch

## **10.0 Investigation-Derived Waste Plan**

No investigation-derived waste will be generated. All decontamination waste water will be disposed of on the site premises and all cuttings from soil borings will be returned to their point of origin.

## **11.0 Project Management**

Project Manager: Richelle Hanson

CLP: Peggy Smith

Safety Officer: TBA

Project Geologist: TBA

Samplers: TBA

## **12.0 Field Equipment**

See Appendix D for a list of the equipment that will be needed for sampling at the Miller Chemical and Fertilizer Company site. The sampling will be conducted according to the Standard Operating Procedures for Field Operations located in Appendix C.

## **13.0 Community Relations**

*Routine site related activities will be handled by the Waste Management Administration's Project Manager. The Environmental Restoration and Redevelopment Program's management will address more complex issues.*

## **Appendix A**

Figure 1: Topographic Map

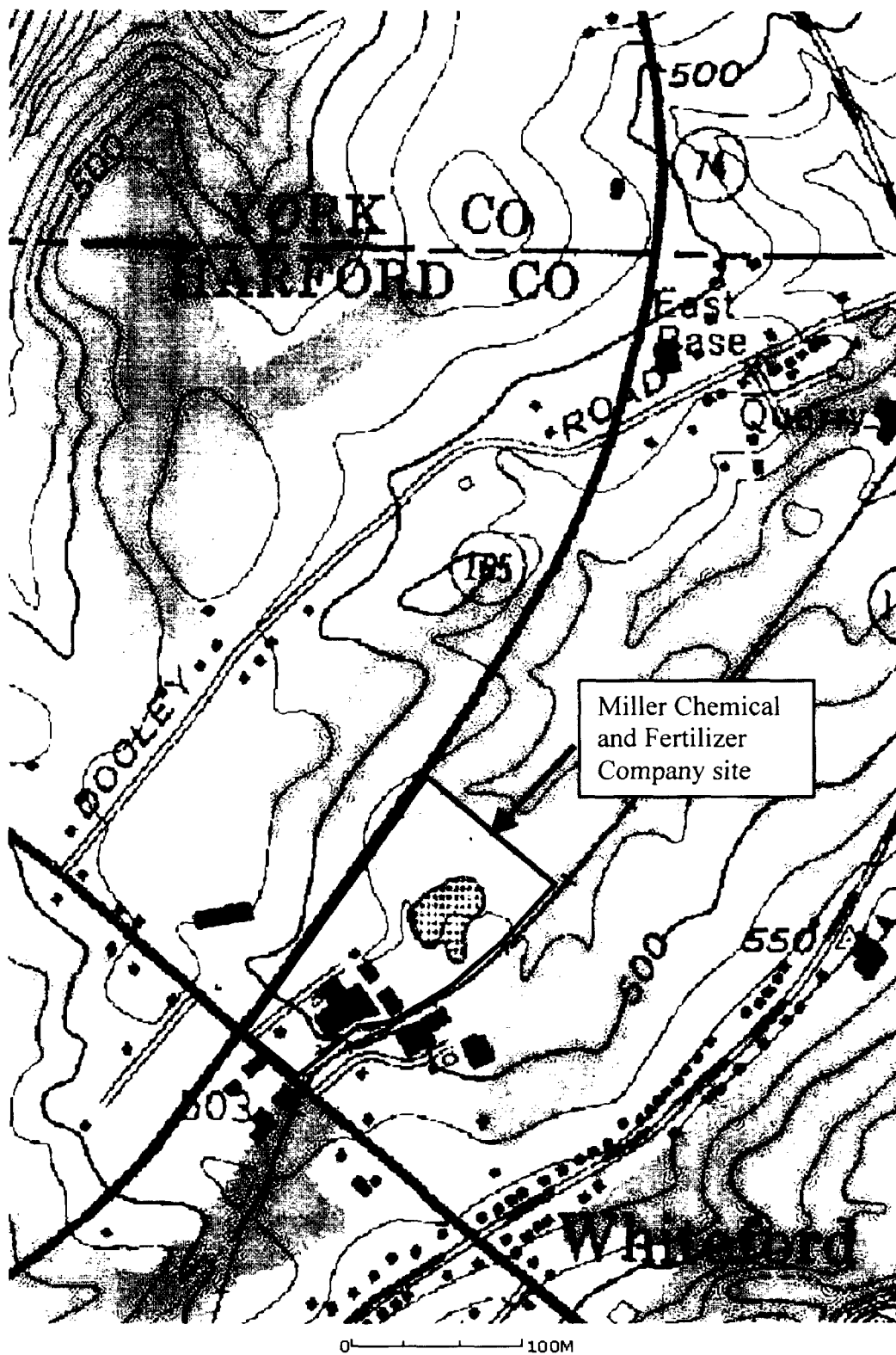
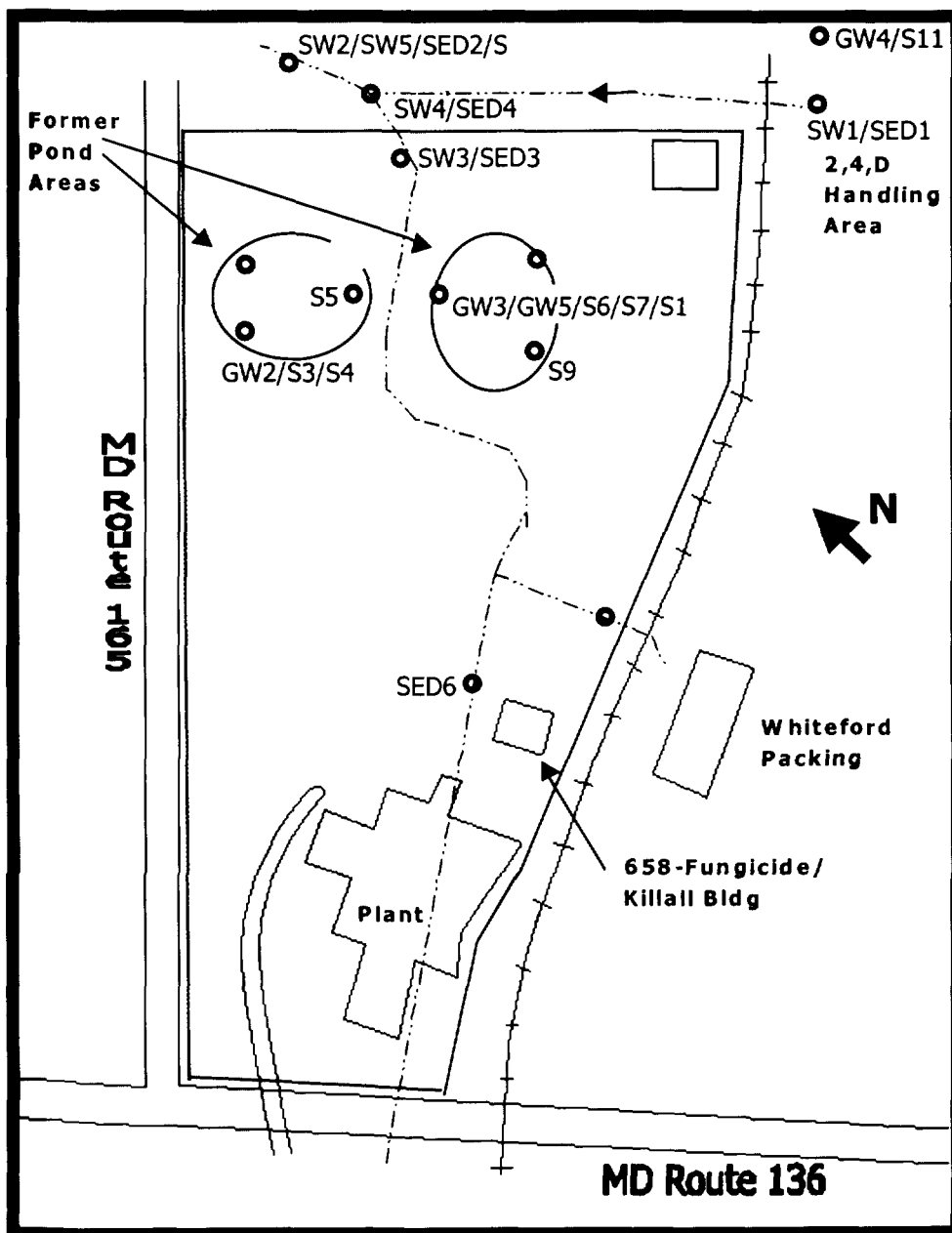


Figure 2: Site /Sampling Sketch Miller Chemical Company MD-123



## **Appendix B**

SITE SAFETY PLAN  
FOR  
Miller Chemical and Fertilizer Company Site  
EXPANDED SITE INSPECTION

STATE OF MARYLAND  
DEPARTMENT OF THE ENVIRONMENT  
WASTE MANAGEMENT ADMINISTRATION  
(MDE/WAS)  
SITE & BROWNFIELDS ASSESSMENT/STATE SUPERFUND DIVISION

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SAFETY PLAN ACKNOWLEDGEMENT FORM

1.0 SITE DESCRIPTION

1.1 SITE NAME AND ADDRESS:

Miller Chemical and Fertilizer Company  
2425 Whiteford Avenue  
Whiteford, MD 21160

1.2 SITE NUMBER: MD-123

1.3 DATES PLANNED ON-SITE: March 2001

1.4 HAZARDS PRESENT OR SUSPECTED:

Lead, arsenic, and PAHs in soil, sediment, and surface water.

1.5 TOTAL AREA OF SITE: 15.5 Acres

1.6 AREA BEING STUDIED: 10 acre filled pond area

1.7 SURROUNDING POPULATION:

On-Site: to be calculated

0 - 1/4 Mile: to be calculated

1/4 - 1/2 Mile: to be calculated

1/2 - 1 Mile: to be calculated

1.8 TOPOGRAPHY OF SITE:

The site is flat at the southern portion of the property where the plant building is located. The northern portion with the filled pond area is lower in elevation and slopes gently toward the adjacent stream.

1.9 WEATHER CONDITIONS AND FORECAST:

TBA

1.10 SITE ACCESS MAPS:

Topographic Map: Refer to figure 1 of sampling plan

Site/Sampling Sketch: Refer to figure 2 of sampling plan

2.0 ENTRY OBJECTIVES

The purpose(s) of this site entry are:

☒ to identify the suspected contamination of groundwater, surface water, sediment and soil in the vicinity of the site.

☒ to determine the degree of contamination of groundwater, surface water, sediment and soil in vicinity of the site.

The following number of samples will be collected:

11 Soil Samples

☐ Soil Gas Samples

☐ On-site Well Water Samples

☐ Production Well Water Samples

☐ Monitoring Well Water Samples

☐ Residential Well Water Samples in the Vicinity

5 Surface Water Samples

5 Groundwater Samples (Geoprobe)

2 Sediment Samples

☐ Air Samples

☐ Container Samples

☐ Leachate

3.0 ON-SITE ORGANIZATION AND COORDINATION

3.1 MDE-WAS CERCLA PRE-REMEDIAL DIVISION REPS:

Contact: Art O'Connell, Division Chief  
2500 Broening Highway  
Baltimore, Maryland 21224  
410-631-3493

The following personnel are designated to carry out the stated job functions on-site. One person may carry out more than one job function. In case of absence of personnel, the alternative will be designated by the Project Manager and/or authorized personnel.

<u>JOB FUNCTION</u>	<u>NAME</u>	<u>WORK PHONE</u>
Project Manager	Richelle Hanson	410-631-3493
Site Safety Officer	TBA	
Field Quality Assurance Officer	TBA	
Site Geologist	TBA	
Sampling Team	TBA	
Drilling Team	TBA	

3.2 OTHER STATE REPS:

<u>AGENCY</u>	<u>NAME</u>	<u>PHONE</u>
---------------	-------------	--------------

3.3 FEDERAL AGENCY REPS:

EPA

3.4 LOCAL AGENCY REPS:

3.5 OTHER REPS:

4.0

ON-SITE WORK PLAN

The following on-site tasks will be performed by the designated personnel: **TBD**

TASK                      TEAM MEMBERS

Decontamination Zone Setup

Decontamination Team

Grid System Setup

On-Site Well Sampling

Soil Sampling

Soil Gas Survey

Well Sampling

Surface Water/Sediment

Air Sampling

Rescue Team

Field GC Sampling Team

Water Level Measuring/Well Purging

## 5.0 SITE CONTROL - WORK ZONES

The following personnel have been designated to coordinate access control and security on-site:

### TBA

In order to prevent or reduce the migration of contaminants, controlled work zones and control points should be set up and marked. Work zones include the Exclusion Zone (hot zone), Contamination Reduction Zone (decon zone), and Support Zone (clean zone). No unauthorized person should be within these areas. Command Post (support zone) should be located upwind from the Exclusion Zone. The control boundaries and access control points into each zone will be marked and made known to all personnel during daily briefing. The work zone is sketched below:

- \* Sampling events at the Miller Chemical and Fertilizer Company will be initiated in level "D" protective wear. The work zones as indicated above are not applicable for this phase of work to be completed.

## 6.0 SAFETY AND SPECIAL TRAINING REQUIRED

All personnel permitted in areas requiring personnel protective equipment and clothing (the hot zone and decontamination zone) must have, as a minimum requirement, attended EPA's Personnel Protection and Safety training course (165-2) or equivalent (165-5). A safety and task briefing meeting will be conducted each day before site entry. The safety procedures, evacuation procedures, escape procedures, as well as the day's planned activities will be discussed.

## 7.0 HAZARD EVALUATION

### 7.1 PRIMARY HAZARDS

The following substance(s) are known or suspected to be on-site. The primary hazards of each are identified as:

Arsenic (CAS 7440-38-2)  
Copper (CAS 7440-50-8)  
Chromium (CAS 7440-47-3)

## 8.0 PERSONNEL PROTECTION EQUIPMENT

### 8.1 TASK TEAM PROTECTION LEVEL

Based on evaluation of potential hazards, the following levels of personnel protection have been designated for each task team:

<u>TASK TEAM</u>	<u>PROTECTION LEVEL (A,B,C,D, OTHER)</u>
Decontamination Zone Setup	D
Grid System Setup	N/A
Well Sampling	D
Soil Gas Survey	N/A
Soil Sampling	D
Surface Water Sediment Sampling	D
Residential Well Sampling	D
Air Sampling	N/A
Container Sampling	N/A
Rescue Team	N/A
Decontamination Team	D
Drilling Team	N/A
Soil Boring Sampling/GC Analysis	N/A
Split Spoon Soil Sampling	N/A

## 8.2

### SPECIFIC PROTECTIVE EQUIPMENT

Specific protective equipment for each protection level:

#### LEVEL A

Fully encapsulating chemical-resistant suit

Pressure-demand, self-contained breathing apparatus (SCBA)

Coveralls\*

Long cotton underwear\*

Gloves(inner), chemical resistant

Boots, chemical-resistant, steel toe and shank

Hard hat (under suit)\*

Disposable gloves and boot covers\* (worn over fully encapsulating suit)

Cooling unit\*

2-way radio communications (inherently safe)

(\*) OPTIONAL

#### LEVEL B

Pressure-demand, self-contained breathing apparatus (SCBA)

Chemical-resistant clothing (includes: overalls and long-sleeved jacket; hooded, one or two-piece chemical splash suit; disposable chemical-resistant, one-piece suits)

Long cotton underwear\*

Coveralls\*

Gloves (outer), chemical-resistant

Gloves (inner), chemical-resistant

Boots, chemical-resistant, steel toe and shank

Disposable boot covers, chemical-resistant\*

Hard hat (face shield)\*

2-way radio communications (inherently safe)\*

(\*) OPTIONAL

#### LEVEL C

Air-purifying respirator, full-face, canister-equipped

Chemical-resistant clothing (includes: coveralls; hooded one or two-piece chemical-resistant coveralls)

Coveralls\*

Long cotton underwear\*

Gloves (outer), chemical-resistant

Gloves (inner), chemical-resistant

Boots, chemical-resistant, steel toe and shank

Disposable boot covers, chemical-resistant\*

Hard hat (face shield)\*

Escape mask\*

2-way radio communications (inherently safe)\*

(\*) OPTIONAL

LEVEL D

Coveralls

Gloves\*

Boots/Shoes, leather or chemical-resistant, steel toe and shank

Safety glasses or chemical-splash goggles\*

Hard hat (face shield)\*

Disposable boot covers\*

Escape mask\*

(\*) OPTIONAL

OTHERS

Level B or Level C can be modified to fit the actual situation when necessary upon approval from Safety Officer. If air-purifying respirators are selected, the appropriate cartridge for use corresponding to the involved substances and concentrations will be designated as:

<u>SUBSTANCE</u>	<u>CARTRIDGE</u>
------------------	------------------

Modified Level D:

Respirator, organic/particulate cartridge

No changes to the specified levels of protection shall be made without the approval of the safety officer and the project manager.

## 9.0 MONITORING

### 9.1 ENVIRONMENTAL MONITORING

The following environmental monitoring instruments shall be used on-site (circle when applicable) at the specified intervals.

<u>INSTRUMENT</u>	<u>FREQUENCY</u>
-------------------	------------------

Combustible Gas Indicator	continuous/hourly/daily/other
Oxygen Monitor	continuous/hourly/daily/other
Draeger Tubes	continuous/hourly/daily/other

<u>INSTRUMENT</u>	<u>FREQUENCY</u>
-------------------	------------------

Metal Detector	continuous/hourly/daily/other
HNU/OVA	continuous/hourly/daily/other ____ Microtip

\*Microtip to be used on an as needed basis and for Soil samples.

Radiation Detector Equipment:

Mini Alert Monitor 4  
Personal Radiation Monitor **BADGES**

Count Rate Meter Initial site entry/other  
Geiger-Mueller Radiation

### 9.2 HEAT STRESS MONITORING

For monitoring the body's recuperative ability to handle excess heat, one or more of the following techniques should be used as a screening technique. Monitoring of personnel wearing protective clothing should commence when the ambient temperature is 70 degrees Fahrenheit or above. Frequency of monitoring should increase as the ambient temperature increases or if slow recovery rates are indicated. When temperatures exceed 80 degrees Fahrenheit, workers must be monitored for heat stress after every work period.

Heart rate (HR) should be measured by the radial pulse for 30 seconds as early as possible in the resting period. The HR at the beginning of the rest period should not exceed 110 beats per minute. If the HR is higher, the next work period should be shortened by 10 minutes (or 33%), while the length of the rest period stays the same. If the pulse rate is 100 beats per minute at the beginning of the next rest period, the following work cycle should be shortened by 33%.

Body temperature should be measured orally with a clinical thermometer as early as possible in the resting period. Oral temperature (OT) at the beginning of the rest period should not exceed 99 degrees Fahrenheit. If it does, the next work period should be shortened by 10 minutes (or 33%), while the length of the rest period stays the same. However, if the OT exceeds 99.7 degrees Fahrenheit at the beginning of the next rest period, the following work cycle should be further shortened by 33%. OT should be measured again at the end of the rest period to make sure that it has dropped below 99 degrees Fahrenheit.

Body water loss (BWL) due to sweating should be measured by weighing the worker in the morning and in the evening. The clothing worn should be similar at both weighings; preferably the worker should be nude. The scale should be accurate to plus or minus 1/4 lb. BWL should not exceed 1.5% of the total body weight. If it does, workers should be instructed to increase their daily intake of fluids by the weight lost. Ideally, body fluids should be maintained at a constant level during the workday. This requires replacement of salt lost in sweat as well.

Good hygienic standards must be maintained by frequent change of clothing and showering. Clothing should be permitted to dry during rest periods. Persons who notice skin problems should immediately consult medical personnel.

## 10.0 COMMUNICATION PROCEDURES

### 10.1 EMERGENCY SIGNAL - LEAVE HOT ZONE

The following signal is the emergency signal to indicate that all personnel should leave the Exclusion Zone:

N/A

Is a loud hailer required (YES/NO): NO

### 10.2 HAND SIGNALS

The following standard hand signals will be used in case of radio communication failure:

<u>HAND SIGNALS</u>	<u>INDICATIONS</u>
Hand gripping throat	Out of air, can't breathe
Pat on partner's shoulders	Leave area immediately
Both hands around waist	Leave area immediately
Grip partner's wrist	Leave area immediately
Hands on top of head	Need assistance
Thumbs up	OK, I am alright, I understand
Thumbs down	No, negative

\*Communication at the Miller Chemical and Fertilizer will be done primarily through verbal contact.

### 10.3 LOCATION OF TELEPHONE

The location of on-site phone: mobile phone in sampling van.

The location of the nearest off-site phone (need to be mentioned during briefing):  
TBD

### 11.0 DECONTAMINATION PROCEDURES:

Refer to Site Inspection Quality Assurance Project Plan.

### 12. EMERGENCY PLAN

#### 12.1 EMERGENCY MEDICAL CARE FACILITY

Medical Facility: Fallston General Hospital

Address: 200 Milton Avenue  
Fallston, MD

Phone Number: 410-877-3700

Time Needed to Reach Facility: 33 minutes driving time.

Person Contacted: Administration

Directions to Hospital from site: Go south on MD-165 for 2.5 miles. Turn right on MD-543 for 8.6 miles. Turn right on US-1 for 5.7 miles.

Designated place for medical facility access map Sampling Van:

Local ambulance available: Yes

Ambulance phone number: 911

Ambulance response time: Unknown

(Whenever possible, arrangements should be made for on-site standby.)

#### 12.2 FIRST-AID EQUIPMENT ON-SITE

First-aid equipment is available on-site at the following locations:

First-Aid Kit: Sampling Van

Emergency Eye Wash: Sampling Van

#### 12.3 EMERGENCY MEDICAL INFORMATION

Emergency medical information for substances present (from NIOSH Pocket Guide to Chemical Hazards):

SUBSTANCES      EXPOSURE SYMPTOMS      FIRST-AID INSTRUCTIONS

12.4 OTHER EMERGENCY PHONE LIST

List of Emergency Phone Numbers:

<u>AGENCY/FACILITY</u>	<u>CONTACT</u>	<u>PHONE NUMBER</u>
Police		911
Fire		911
Haz Mat Unit	MDE	410-333-2950
State Hazardous Material and Oil Response Unit	MDE	410-333-2950

Helicopter Ambulance

13.0 EMERGENCY PROCEDURES

The following standard emergency procedures will be used by on-site staff who are also responsible for ensuring that the appropriate procedures are followed.

13.1 Personnel Injury in Hot Zone.

Designated emergency signal:

Upon notification of an injury in the exclusion zone, the designated emergency signal shall be sounded. All site personnel shall assemble at the decontamination line. The rescue team will enter the hot zone with proper level of protection to remove the injured person(s) to the decontamination zone. The Site Safety Officer and Project Manager should evaluate the nature of the injury, and the affected person(s) should be decontaminated to the extent possible prior to movement to the Support Zone. The Site Safety Officer shall initiate the appropriate first aid, and contact should be made for an ambulance and with the designated medical facility (if required). No persons shall reenter the Exclusion Zone until the cause of the injury or symptoms are determined.

### 13.2 Personnel Injury in the Clean Zone.

#### Designated Emergency Signal:

Upon notification of an injury in the Support Zone, the Project Manager and Site Safety Officer will assess the nature of the injury. If the cause of the injury or loss of the injured person does not affect the performance of site personnel, operations may continue, with the Site Safety Officer initiating the appropriate first aid and necessary follow-up as stated above. If the injury increases the risk of others, the designated emergency signal shall be sounded and all site personnel shall move to the decontamination line for further instructions. Activities on-site will stop until the added risk is removed or minimized.

### 13.3 Fire or Explosion.

#### Designated Emergency Signal:

Upon notification of a fire or explosion on-site, the designated emergency signal shall be sounded and all site personnel assembled at the decontamination line. The fire department shall be alerted and all personnel moved to a safe distance from the involved area.

### 13.4 Personal Protective Equipment Failure.

If any site worker experiences a failure or alteration of protective equipment that affects the protection factor, that person and his/her buddy shall immediately leave the Exclusion Zone. Reentry shall not be permitted until the equipment has been repaired or replaced.

### 13.5 Other Equipment Failure.

If any other equipment on-site fails to operate properly, the Project Manager and Site Safety Officer shall be notified and then determine the effect of this failure on continuing operations on-site. If the failure affects the safety of personnel or prevents completion of the Work Plan tasks, all personnel shall leave the Exclusion Zone until the situation is evaluated and appropriate actions taken. Standby protective and monitoring equipment will be provided to ensure adequate protection in the event of equipment failure.

### 13.6 Alternate Escape Route from Hot Zone.

Figure X shows the designated emergency escape routes in the situations where egress from the Exclusion Zone cannot occur through the decontamination corridor.

### 13.7 Reentry after Emergency Evacuation.

In all situations, when an on-site emergency results in evacuating the Exclusion Zone, personnel shall not reenter until:

1. The conditions resulting in the emergency have been corrected.
2. The hazards have been reassessed.

3. The Site Safety Plan has been reviewed.
4. Site personnel have been briefed on any changes in the Site Safety Plan.

**EMERGENCY PROCEDURES SUMMARY:**

- \* Designated work zones are not applicable during this phase of the SI, therefore emergency signals other than those indicated in section 10.2 have not been established. The primary means of communication on site will be through verbal contact.

## SAFETY PLAN ACKNOWLEDGEMENT FORM

All site personnel and site visitors have read the above plan and are familiar with its provisions.

NAME \_\_\_\_\_

AGENCY

SIGNATURE

[illegible]

## **Appendix C**

### **Standard Operating Procedures for Field Operations**

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## STANDARD OPERATING PROCEDURE FOR FIELD OPERATIONS

### Physical Samples:

These operating procedures describe the standard methods utilized by the MD WMA for obtaining accurate and representative field samples from sites containing potentially hazardous materials/ wastes.

The purpose of these operating procedures are to assure quality control in field operations and provide uniformity in technician field techniques.

All equipment utilized for sampling purposes will be cleaned and calibrated prior to utilization. Calibrations will be done in accordance with the manufacturer's specifications. Contaminated sample equipment will be decontaminated prior to exit from the contamination reduction zone. (See Standard Operation Procedure for Field Decontamination.)

Any equipment that becomes inoperative in the field will be clearly marked as such and returned to proper technical personnel for repair or replacement.

Each site team will maintain a bound logbook detailing all information deemed pertinent to the investigation. Examples of pertinent information are as follows:

1. Date, times of arrivals and departure.
2. Project name and location.
3. Site personnel - team members and site coordinator.
4. Site operations to be carried out.
5. Accurate site sketch to include buildings, wells, tanks, surface waters, locations of sample points, etc.
6. List of samples - to include sample number, time of sample, sampler, sample location identifier.
7. Equipment field calibration results.
8. Observations pertinent to the description of the overall site.
9. Weather conditions/site conditions.

## STANDARD OPERATING PROCEDURE FOR DETERMINING LEVELS OF PROTECTION DURING SITE SAMPLING

This procedure describes the MD WMA standard method for determination of levels of protection to be utilized in site sampling operations.

The purpose of this procedure is to ensure the health and safety of the site sampling team.

This procedure identifies the four standard levels of personnel protection that may be used by MD WMA personnel during any site investigation. This procedure is extracted from the EPA-OERR-Hazardous Response Support Division's document "Standard Operating Safety Guides" published by USEPA 10/84.

### 1. Level D Protection

- a. Level D Protection is the lowest level of protection to be utilized. Level D Protection consists of coverall (or long-sleeved shirt and pants) steel-toed boots and hard hat.
- b. This level is utilized in areas where there is no possibility of contact with environmental contaminants.

### 2. Level C Protection

- a. Level C Protection consists of a chemical resistant coverall, full face air purifying respirator, two layers of chemical resistant gloves, two layers of protective boots, hard hat, face shield, and duct tape to seal gloves, boot and coverall joints.
- b. Level C Protection should be used when the type and concentration of airborne contaminants is known or can be measured, and the oxygen concentrations are greater than 19.5%. Level C should not be used where there is a possibility of direct skin contact with materials.

### 3. Level B Protection

- a. Level B Protection consists of a pressure demand self-contained breathing apparatus (SCBA), chemical resistant "Saranex Tyvek" coverall with hood, two layers of chemical resistant gloves, two layers of protective boots, hard hat, and duct tape for sealing openings.
- b. Level B Protection shall be utilized when any of the following criteria are met:

1. The type and concentration of toxic substances have been identified and require a high degree of respiratory protection, however, contaminant contact with the skin is not a primary concern.
2. There is a possibility that the oxygen concentration in the work area is below 19.5%.
3. Real time organic vapor meter (PID) measurement indicates "action" levels of unidentified vapors, however, vapors are not suspected of containing high levels of chemicals toxic to the skin.
4. Work being done on-site will not generate continuous high levels of contaminant vapors, gases, or particulates (>500 ppm) nor will it generate splashes of material that could affect the skin of site personnel.

#### 4. Level A Protection

- a. Level A Protection consists of a pressure demand self-contained breathing apparatus (SCBA), fully encapsulating chemical-resistant suit, coverall, two layers of chemical resistant gloves, two layers of protective boots, hard hat (under suit).
- b. Level A Protection shall be utilized when any of the following criteria are met:
  1. The chemical substance has been identified and requires the highest level of protection for the skin, eyes, and respiratory system.
  2. Acutely hazardous substances are known or suspected to be present and skin contact might be possible.
  3. Real time vapor measurements indicate continuous high levels of unidentified substances (i.e. >500 ppm).

## STANDARD OPERATING PROCEDURES FOR PREPARATION OF FIELD BLANKS AND DUPLICATES

This operating procedure describes the MD WMA standard method for preparing field blanks and duplicates.

The purpose of this operating procedure is to assure uniformity in field techniques and to serve as an indicator of sample contamination throughout the entire sampling and analysis process.

The following equipment is to be utilized for preparation of field blanks and duplicates: sample containers, label tape, waterproof marker, deionized distilled water.

Procedures to be followed for preparing field blanks and duplicates are:

Obtain the necessary approved sample containers.

### Trip Blanks:

1. One working day prior to performing on-site sampling, submit 40 ml VOCs (a minimum of one trip blank - 2 vials - per day per site inspection) to the Division of Environmental Chemistry (MD DHMH, Labs Administration) for preparation of trip blanks. The Laboratory will fill the containers with distilled, deionized, contaminant-free water, which it has prepared. (This water was prepared by being passed through a filtration and finally reverse osmosis water purification unit. The water is then distilled daily to drive off any trace volatiles.) These trip blanks will be issued through chain of custody in the Laboratory to the field sampler.

Alternatively, the trip blanks may be prepared by the Field Quality Control Manager or Site Project Manager.

2. Preserve the sample with hydrochloric acid to pH less than 2, and store in an insulated container with ice to a temperature less than 4° C.
3. Label and tag the containers as a trip blank sample and record all pertinent information in the field logbook.
4. Transport and store these trip blanks in the same manner as the site inspection samples but do not open them.
5. Maintain and document trip blank possession according to the Chain of Custody procedures in Section VI of the Quality Assurance Project Plan.
6. Submit the trip blanks with the site inspection samples to the appropriate laboratory for VOA analyses.

### Field Blanks:

1. One working day prior to performing on-site sampling, obtain distilled, deionized, contaminant-free water from the Division of Environmental Chemistry (MD DHMH, Labs Administration). The water is stored in appropriate containers (currently 5-gallon carboys are used). Record all information concerning the water in the field logbook.
2. Transport and store this water in a manner to avoid contamination (e.g. away from fuel, preservatives, etc.). Currently, the carboys are stored in the Site Assessment Division Sampling Van, which remains locked.
3. Once in the field, fill one of each type of sample container for each type of matrix with the distilled, deionized, contaminant-free water from the Laboratory. If appropriate, add the required preservatives to the container.
4. Label the containers to identify them as field blank samples and record all pertinent information in the field logbook.
5. Store and transport these field blanks in the same manner as the site inspection samples.
6. Maintain and document field blank possession according to the Chain of Custody procedures in Section VI of the Quality Assurance Project Plan.
7. Submit the field blanks with the site inspection samples to the appropriate laboratory for analyses required by the site sampling plan.

#### Duplicate Samples:

1. Duplicate samples will be collected at a frequency of one duplicate per 20 samples per matrix. Samples for duplicate analysis will be specified in the site-sampling plan.
2. Once the sample for duplication is determined, collect the sample according to the appropriate Standard Operating Procedure, splitting the sample matrix between two like container types. The duplicate sample must be collected from exactly the same location with the same collection apparatus as the actual sample. (For example, a scoop of soil should be equally split between two identical 8-ounce glass jars.) A duplicate sample should be collected using each container type and appropriate preservatives.
3. The duplicate samples should be labeled as any other sample so as not to bias the Laboratory's analysis. Record all pertinent information in the field logbook.
4. Store and transport these duplicate samples in the same manner as the site inspection samples.
5. Maintain and document duplicate sample possession according to the Chain of Custody procedures in Section VI of the Quality Assurance Project Plan.
6. Submit the duplicate samples with the site inspection samples to the appropriate laboratory for analyses required by the site-sampling plan.

#### STANDARD OPERATING PROCEDURE FOR SOIL SAMPLING

This operating procedure describes the MD WMA standard method for the collection of representative samples of soils for physical and chemical analysis from a potential hazardous waste site.

The purpose of this operating procedure is to assure uniformity in technician field techniques so as to obtain accurate and reproducible data.

All equipment utilized in these methods must be adequately decontaminated prior to samples being taken.

#### Surface Soils Sampling Method:

The following equipment is to be utilized for obtaining surface soil samples: surveyor flags or stakes, stainless-steel sample trowel, stainless-steel scoops, stainless-steel bucket, sample containers with labels, waterproof markers, organic vapor meter, decontamination equipment.

Procedures for obtaining a representative surface soil sample are as follows:

1. Locate sample points as identified in the sampling plan for the individual site study.
2. Prepare sample containers according to the needs of the study. Refer to Section V, Laboratory and Field Integration, Appendix A, Division of Environmental Chemistry (MD DHMH, Labs Administration) Quality Assurance Document for proper sample containers, preservatives and holding times.
3. Stake out a three-foot square over each sample point. Care must be taken in this procedure so as not to contaminate the surface by stepping in the delineated area.
4. Take a one-inch deep, six-inch square sample from each of the four corners and the center of the square.
5. Composite these samples by mixing soil with a stainless-steel trowel in the stainless-steel bucket. (Be careful to avoid vegetative material and larger gravels.) Composite samples should be monitored with the organic vapor meter to determine if organic constituents may be present.
6. Place homogenized composite soils in sample containers. Discrete samples should be taken for volatile organic analyses.
7. Record all pertinent information in the logbook. Pertinent information should include: site sketch, date, time, technicians, sample types, sample locations, description of site, weather conditions, soil type and consistency.
8. After samples have been obtained, the exterior of the sample containers should be rinsed with distilled water and dried with a clean cotton wiping cloth.
9. Maintain and document sample possession according to the Chain of Custody Procedures in Section VI, of the Quality Assurance Project Plan.

#### Subsurface Soil Sampling Method:

The following equipment is to be utilized for obtaining subsurface soil samples: surveyors' flags or stakes, stainless-steel or chrome plated hand auger, stainless-steel bucket, stainless-steel trowel, stainless-steel scoops, 3'x3' plastic sheets, sample containers with labels, waterproof markers, organic vapor meter, decontamination equipment.

Procedures for obtaining representative subsurface soil samples are as follows:

1. Locate sample points as identified in the site specific sampling plan.
2. Determine sample depth intervals from the sampling plan.
3. Prepare sample containers according to the needs of the study. Refer to Section V, Laboratory and Field Integration, Appendix A, Division of Environmental Chemistry (MD DHMH, Labs Administration) Quality Assurance Document for proper sample containers, preservatives and holding times.
4. Carefully advance the auger through the soils removing each auger of soil and reserving soil on plastic sheeting placed downgradient of the auger hole.
5. Monitor organic emissions from the borehole utilizing the organic vapor meter and record any readings and at depths encountered in the logbook.
6. Prior to sampling the strata of interest, decontaminate the auger. (See Standard Operating Procedure for Field Decontamination.)
7. Subsurface samples are to be obtained as per the site-sampling plan and at any other depths where contamination is encountered.
8. Record depths to the nearest foot of obvious contamination zones and make note of any changes in soil character and moisture content.
9. Following completion of auguring, decontaminate the auger. (See Standard Operating Procedure for Field Decontamination.)
10. If composited samples are required, composite in stainless steel bucket and transfer to sample containers as described in items 5-7 of aforementioned surface soil sampling method.
11. The exterior of the sample container should be rinsed with distilled water and dried with a clean wiping cloth after the sample has been obtained.
12. Maintain and document sample possession according to the Chain of Custody Procedures in Section VI of the Quality Assurance Project Plan.

## STANDARD OPERATING PROCEDURE FOR SURFACE WATER SAMPLING

This operating procedure describes the MD WMA standard method for the collection of a representative sample of surface waters in free flowing and/or open water bodies.

The purpose of this operating procedure is to assure quality control in field operations and to assure uniformity in technician field techniques so as to obtain accurate and reproducible data.

The following equipment is to be utilized for obtaining surface water samples: appropriate sample containers as detailed in the site sampling plan, label tape, distilled water, clean lint-free cotton wiping cloths, waterproof marking pens, bucket.

Procedures for obtaining a representative surface water sample are as follows:

1. Sampling is to begin at the furthest downstream point identified in the site-sampling plan.
2. Open container and fill, moving container in an upstream direction. Avoid strong agitation of the waters.
3. Fix samples as required and in accordance with the site sampling plan. Refer to Section V, Laboratory and Field Integration, Appendix A, Division of Environmental Chemistry (MD DHMH, Labs Administration) Quality Assurance Document for proper sample containers, preservatives, and holding times.
4. Close container, rinse with distilled water and dry with cloth.
5. Label container to identify sample station as outlined in the site-sampling plan.
6. Obtain a bucket of water. Perform pH and specific conductance checks according to Standard Operating Procedure for Use and Calibration of pH and Specific Conductance Meters.
7. Record all pertinent field information in logbook (to include any in-situ measurements).
8. Samples are to be packed in ice and placed in cooler pending delivery to laboratory. Maintain and document sample possession according to the Chain of Custody Procedures in Section VI of the Quality Assurance Project Plan.
9. Proceed to next upstream station and repeat procedure.

## STANDARD OPERATING PROCEDURE FOR SUBAQUEOUS SEDIMENT SAMPLING

This operating procedure describes the MD WMA's standard method for obtaining samples of sediments from subaqueous deposits.

The purpose of this operating procedure is to assure uniformity in technician field techniques so as to obtain accurate and reproducible data.

The following equipment is to be utilized for obtaining sediment samples: stainless-steel scoop, stainless-steel bucket, sample containers, label tape and waterproof markers.

Procedures for obtaining samples of subaqueous sediments are as follows:

1. Proceed to the farthest downstream sample location as determined in the site sampling plan. (In a free-flowing stream, samples should be obtained from pooled areas where settling of particulates will have occurred.)
2. Move the scoop in an upstream direction to obtain sample.
3. Transfer sample directly into sample containers. Refer to Section V, Laboratory and field Integration, Appendix A, Hazardous Waste Laboratory Quality Assurance Document for proper sample containers, preservatives and holding times.
4. Allow fine materials to settle in the container and then decant liquid off top of sample as necessary, being careful to retain fine sediments.
5. Secure sample container and label properly.
6. Clean exterior of containers with distilled water and pack for transport to laboratory.
7. Proceed to the next upstream station and repeat steps until uppermost station has been completed.
8. Maintain and document sample possession according to the Chain of Custody Procedures in Section VI of the Quality Assurance Project Plan.

## STANDARD OPERATING PROCEDURE FOR OBTAINING SAMPLES OF DRUMMED LIQUID MATERIALS

This operating procedure describes the standard method utilized by MD WMA to obtain samples from drummed liquid material.

The purpose of this operating procedure is to assure uniformity in technician field techniques during site investigations.

The following equipment is to be utilized for obtaining samples from drummed material: non-sparking bung wrench, non-sparking chisel, non-sparking hammer, organic vapor meter (PID or equivalent), hydrion paper for determining pH, sample containers, label tape, waterproof marking pen, 10 mm glass drum, thief or glass colliwasa, absorbent pads, cotton cloth, plastic bag, personnel protective equipment as per guidelines.

Determine proper personnel protection required for the individual circumstance. Sampling is to be accomplished with a minimum of a three-technician team: at least two entry technicians and one back-up technician. Prior to any activities, the drum should be scanned with the organic vapor meter to determine if any vapors are being emitted. Condition of drum and all identifying marks should be noted and recorded in the field logbook. The following procedures should be followed in sampling:

1. Clean top of drum with cloth.
2. Place organic vapor meter near large bung hole of drum.
3. Carefully remove large bung allowing for pressure equalization. Place an additional absorbent pad next to bung hole.
4. Measure and record any organic vapor meter readings.
5. Using hydrion paper, measure and record the pH of material in drum.
6. Insert drum thief/colliwasa through bung hole to bottom of drum. Remove thief/colliwasa carefully checking liquid for stratification, color, etc. Place liquid in appropriate sample container. (Refer to Section V Laboratory and Field Integration, Appendix A, Division of Environmental Chemistry (MD DHMH, Labs Administration) Quality Assurance Document, for proper sample containers, preservatives and holding times.) Repeat as necessary to fill all containers, being careful not to spill any material. Samples should be placed in whirl packs.
7. Wipe off sample thief and top of drum to remove any residue of sample. Discard thief/colliwasa, all wiping cloths, and absorbent pads into plastic bag. Dispose in accordance with Federal/State Regulations.
8. Maintain and document sample possession according to the Chain of Custody Procedures in Section VI of the Quality Assurance Project Plan.

## STANDARD OPERATING PROCEDURE FOR GROUNDWATER MONITORING WELL SAMPLING

This operating procedure describes the MD WMA standard method for the collection of representative samples of groundwater from nonpotable monitoring wells.

The purpose of this operating procedure is to assure uniformity in technician field techniques so as to obtain accurate and reproducible data.

The following equipment is to be utilized for obtaining groundwater monitoring well samples: weighted tape measure, organic vapor meter, flashlight and/or mirror, teflon bailer(s), dedicated or disposable bailer line, decontamination equipment, purge device (bailer, submersible pump, bladder pump, etc.), 5-gallon bucket, sample containers, label tape, waterproof marker, filtering equipment (See Standard Operating Procedure for Filtering Groundwater for Metals Analysis), pH meter, and specific conductance meter.

Procedures for obtaining representative groundwater samples are as follows:

### A. Preliminary Inspection Phase

1. Inspect the condition of the monitoring well and record all pertinent information in the field logbook. This information includes: well ID number, the casing height above ground, soundness of protective casing, and effectiveness of surface grout seal.
2. Position the organic vapor meter near the well cap so as to measure any organic vapors emanating from the well and to evaluate the safety level.
3. Remove well cap and note organic vapor meter response. Record readings in logbook.
4. Use flashlight and/or mirror to inspect the interior of the well. Record all observations in the logbook.
5. Measure the depth to the water's surface from the top of the casing using the weighted tape measure. Record this depth to the nearest one-hundredth of a foot.
6. Measure the depth to the bottom of the well from the top of the casing using the weighted tape measure. Record this depth to the nearest one-hundredth of a foot.

### B. Evacuation Phase

1. Using the following formula, calculate the total gallons of water required to evacuate three well volumes of water from the monitoring well.  
Depth to Bottom of Well Minus (-) Depth to Water Times (x) Well Diameter  
Factor Equals (=) Number of Gallons Which Should be Evacuated.  
Well diameter Factor (3 well volumes)  
Well Diameter (inches)                      Gallons/Foot of Water

2

0.5

3  
4  
6

1  
2  
4.5

(e.g. a four inch diameter well, 60 feet total depth with water level at 35 feet would have 25 feet of standing water and would require 50 gallons (25 x 2 gallons/foot) be purged before a sample could be collected.)

2. To purge the standing water, the pump needs to be set at a position between the water surface and five feet above the well screen. Once the water within the casing is purged, the pump should be lowered just above the well screen to withdraw groundwater from the aquifer. Measure the total amount of water discharged using a five gallon bucket and continue to pump and measure until the desired amount of water has been purged from the well.
3. When using a bailer to purge the monitoring well, measure the amount of water withdrawn from the well using a five-gallon bucket until the desired volume of water is purged from the well.
4. If the well purges dry and does not recharge in a reasonable amount of time, bail or pump dry again to withdraw at least two well volumes before sampling the well after recharge has occurred, which may require sample collection on the following day.
5. If purged groundwater is known or suspected to possess hazardous characteristics or contaminants, the purged water must be collected for storage and proper disposal. (Otherwise, purged water must be discharged at least 25 feet downgradient of the well.)

### C. Sampling Phase

1. Remove a bail of water from the well and measure the pH and specific conductance. Record time, temperature, pH and specific conductance in field log book.
2. Carefully lower the teflon bailer into the well so as not to disturb the water. Gently lift the bailer and fill the sample bottles as required by the site-sampling plan in the following order:
  - a. (2) 40 ml glass VOCs;
  - b. Amber glass liter extractable jars (organic extractables);
  - c. Amber glass gallon jugs (pesticides);
  - d. Liter cubitainer (metals);
  - e. Glass liter jars (oil and grease);
  - f. Glass 8 ounce jars (spare for PCBs).Fix samples as required in Section V, Laboratory and Field Integration, Appendix A, Hazardous Waste Laboratory Quality Assurance Document.
3. Filter samples for metals analysis according to Standard Operating Procedure.
4. Thoroughly decontaminate all equipment and properly dispose of all contaminated materials. (See Standard Operating Procedure for Field Decontamination.)
5. Maintain and document sample possession according to the Chain of Custody Procedures in Section VI of the Quality Assurance Project Plan.

## STANDARD OPERATING PROCEDURE FOR FILTERING GROUNDWATER FOR METALS ANALYSIS

This operating procedure describes the MD WMA standard method for filtering groundwater obtained from monitoring wells for analysis of dissolved metal concentrations.

The purpose of this operating procedure is to assure uniformity in field techniques so as to obtain accurate and reproducible data.

The following equipment is to be utilized for filtering groundwater: sample containers, label tape, waterproof marker, vacuum pump, plastic tubing, filter assembly, 0.45 um micropore filters.

Procedures for filtering groundwater are as follows:

1. After filling all other required sample containers at the well sampling location, collect a one-liter sample of water in a polyethylene container without preservation.
2. Assemble the filtration apparatus, using surgical gloves and tweezers to place a 0.45 um micropore filter on the lower filter assembly so that it lays flat on the unit. Carefully connect the upper and lower units of the filter assembly.
3. Connect the pump, tubing, and filter assembly. Operate the pump to create a vacuum on the system to draw water from the sample bottle through the assembly into a clean poly bottle. If the filter becomes clogged, release the vacuum, replace the filter, and then resume filtering as before.
4. Once the entire 1-L volume of water collected at the sample location has been filtered, then preserve the filtered water. Add concentrated nitric acid to the filtered water until the pH is less than 2, and record the amount of acid required.
5. Disconnect the filter assembly. Dispose of the used filter and rinse the entire assembly with dilute nitric acid solution. This includes running approximately 20 - 30 ml of dilute acid through the tubing using the pump vacuum. Follow this with at least two rinses of DI water, including running about 100 ml of DI water through the tubing.
6. Record all pertinent information in the field logbook.
7. Maintain and document sample possession according to the Chain of Custody procedures in Section VI of the Quality Assurance Project Plan.

## STANDARD OPERATING PROCEDURE FOR RESIDENTIAL WELL SAMPLING

This operating procedure describes the MD WMA standard method for the collection of representative samples of groundwater from residential potable-water wells.

The purpose of this operating procedure is to assure uniformity in technician field techniques so as to obtain accurate and reproducible data.

The following equipment is to be utilized for obtaining residential well samples: sample containers, label tape, waterproof marker, pH meter, specific conductance meter.

Procedures for obtaining a representative residential well sample are as follows:

1. Select residential wells for sampling according to the site-sampling plan.
2. Obtain as much information about the well and the plumbing system as possible from the homeowner and from observation. This information could include: location, well tag number, age of the well, construction of the well, depth of the well, well driller, well completion report, location of possible sources of contamination (septic systems, fuel tanks, barn yards, etc), location of other wells, type of plumbing in the house, location of water treatment devices, history of taste and/or odor problems, etc. Record all of this information in the field logbook.
3. Select a faucet for sampling as close to the water well outlet as possible. If the water system utilizes any water treatment devices, these should be bypassed while collecting the sample.
4. Utilizing the cold water line, purge the water line of standing water by letting the water run for at least 10 - 20 minutes, depending upon the amount of water used by the resident prior to the sampling visit, depth of the well, and distance from the house.
5. Following purge time, remove any aerators from the faucet and decrease the water flow to reduce turbulence while collecting the samples.
6. Collect a sample, which can be used to determine field parameters for pH, specific conductance, and temperature. Obtain pH and specific conductance readings according to Standard Operating Procedure. Record this information, as well as purge time, in the field logbook.
7. Collect the samples and add preservatives as required by the site-sampling plan. Refer to Section V, Laboratory and Field Integration, Appendix A, Division of Environmental Chemistry (MD DHMH, Labs Administration) Quality Assurance Document for information regarding sample containers and preservatives.
8. Turn off the water and return the residence's water system to its original state.
9. Maintain and document sample possession according to the Chain of Custody Procedures in Section VI of the Quality Assurance Project Plan.

## STANDARD OPERATING PROCEDURE FOR ORGANIC VAPOR METER FIELD CALIBRATION AND USE

This operating procedure describes the MD WMA standard method for real time measurements of volatile airborne contaminants. This procedure specifically addresses photoionization detection methods utilizing the HNu Systems, Inc. Model PL 101 Photoionization Analyzer.

The purpose of this operating procedure is to assure uniformity in technician field techniques so as to obtain accurate and reproducible data.

Bench calibration and checkout of the instrument should be performed one day prior to each field sampling program. Field calibration should be performed minimally at the beginning, middle and end of each working day. Any anomalies encountered in the field should be noted and the instrument should be returned to the proper technicians so that repair and recalibration can occur. All calibration and repair procedures are to be carried out in accordance with the manufacturer's specifications and recommendations.

### Bench Calibration Procedures: (HNu Model PL 101 Photoionization Analyzer)

1. With the function switch in the "Off" position, attach probe to the meter.
2. Rotate function switch clockwise to the "Battery Check" position. The needle on the meter dial should be within the Green Bar region of the dial. If the needle is not in that region, meter indicates insufficient charge and recharge of battery for a minimum of eight hours is required.
3. Rotate function switch for "Standby". Zero the dial readout using the zero potentiometer knob on the right side of the meter.
4. Connect probe to container of span gas and set the function switch on the 0-200 ppm scale. "Crack" valve on span gas and note reading. Adjust the span potentiometer control so that the instrument read out registers the exact value of the span gas.
5. Note all procedures, repairs and calibrations in the instrument log book.
6. Attach label to meter indicating: (1) date of calibration, (2) span setting, (3) calibration gas range, and (4) technician's initials.

### Field Calibration Procedures:

1. With function switch in the "Off" position, attach probe to the meter.
2. Rotate function switch clockwise to the "Battery Check" position. Needle should be well within the Green Bar area on the face plate for use.
3. Rotate switch to "On" position. Very briefly, observe the end of the probe to check that the UV light is on (i.e. purple glow). If light is not visible, check probe connections.
4. Rotate function switch to the "Standby" position and adjust zero potentiometer knobs to achieve zero on meter face. Wait 15-20 seconds to ensure that the zero reading is stable. (Repeat this step every time power is turned on or when span potentiometer has been adjusted.)

- . To measure volatile organic emissions, rotate function switch to the most sensitive scale (0-20). Note the range setting, span potentiometer setting, instrument reading, and time in field log book. If the needle moves off scale, rotate function switch to next scale.
- 6. Avoid probe contact with liquid and solid surfaces. Water vapor may cause fogging of lamp resulting in incorrect readings and volatile contamination of the probe will result in erroneous readings. Clogging of the probe with soils or other materials will also result in erroneous readings or malfunctions. Always allow meter to reach temperature stabilization before making any readings.

## STANDARD OPERATING PROCEDURE FOR USE AND CALIBRATION OF pH AND SPECIFIC CONDUCTANCE METERS

These procedures describe the MD WMA standard methods for field calibration of equipment that may be used for field identification of samples.

The purpose of these operating procedures is to assure uniformity in technician field techniques so as to obtain accurate and reproducible data.

pH Meter: Orion Model 401

The pH meter shall be calibrated, at a minimum, immediately prior to, and immediately after, the sampling run. All information is to be recorded in the field log book.

Calibration procedures:

1. Turn on power and allow instrument to stabilize for three to five minutes. Remove protective cap on pH probe.
2. Rinse pH probe with distilled water and dry with a clean kimwipe.
3. Determine if the pH range will be in the acidic or alkaline range. Select the proper standard buffer solutions to calibrate for expected pH range (7 and 4 for acid, 7 and 10 for base).
4. Using two dry and clean plastic cups, fill with enough buffer solutions to cover electrode.
5. Place pH probe in the 7 buffer. Gently swirl cup. When readout stabilizes, adjust to 7.00 with the span potentiometer knob.
6. Remove probe from buffer solution and rinse with distilled water. Dry probe.
7. Place probe in the pH 10 buffer. Gently swirl cup. When the readout stabilizes, adjust the proper pH reading with the calibration dial.
8. Rinse and dry probe and recheck with pH 7 buffer.
9. Record all information in field logbook.
10. Calibration procedure shall be deemed necessary:
  - a. Every time the instrument is turned on;
  - b. When erratic behavior has been noted;
  - c. When the pH range is outside the original limits of the study (e.g. acidic instead of basic or basic instead of acidic); or
  - d. When there is a significant change in environment (e.g. movement from protected area to outside or movement from shade to direct sunlight).
11. Any problems encountered with pH measurement equipment shall be reported to the proper technician for correction.
12. Field measurement of pH:
  - a. Place enough sample in plastic cup to cover electrode.
  - b. Remove protective caps on probe and rinse thoroughly with distilled water and dry.
  - c. Place probe in sample and gently swirl cup.
  - d. When readout stabilizes, record indicated pH in field logbook.

13. After field measurements have been completed, rinse probe with distilled water and replace protective cap. Discard sample and container and used buffer solutions and containers.

**Specific Conductance Meter:** YSI Model 33

Field calibration for the Salinity Conductivity Temperature (SCT) meter is an internal calibration. The procedures for set up and sample measurements are as follows:

1. Calibrate the meter by turning the "mode" control to "redline" and adjusting the "redline" control so the meter needle lines up with the redline on the meter face. If this cannot be accomplished, replace batteries.
2. Plug probe into the probe jack on the side of the instrument.
3. Place probe into sample to be tested. Switch mode control to the X100 scale. If the reading is below 50 on the 0-500 range, switch to the X10 scale. If reading is still below 50, switch to the X1 scale. Record reading and multiply by scale setting to determine total specific conductance.
4. When measuring on the X100 or X10 scales, a cell test may be made to determine if probe is in good operating order. Depress the "Cell Test" button. The meter reading should fall less than 2%. Should it fall more than 2%, the probe is fouled and measurements will be in error. Refer meter and probe to qualified repair technicians.

## STANDARD OPERATING PROCEDURE FOR FIELD DECONTAMINATION

This operating procedure describes the MD WMA standard method for decontaminating equipment utilized in environmental sampling of potentially hazardous materials.

The purpose of this operating procedure is to assure uniformity in technician field techniques and will be a means to allow traceability of possible cross-contamination of samples or error in laboratory analytical results.

Specialized equipment required for this procedure would include the following: distilled water, stainless-steel pressure sprayer, 5-gallon stainless-steel bucket, Alconox, bristle scrub brush, long handled bottle brush, aluminum foil, Kimwipes, disposable bags, plastic sheeting.

### Decontamination Procedures:

1. Select an area of the site removed from the intended sampling locations and not likely to cause cross-contamination. Stake out a six-foot square of plastic sheeting.
2. Using distilled water in the pressure sprayer, thoroughly wash dirt, mud or particulate material off equipment.
3. Mix decon solution of Alconox (or Liquinox) in bucket with distilled water, 1 gallon of water to 1 cup detergent. Thoroughly wash and scrub equipment.
4. Rinse equipment three times with distilled water and dry with Kimwipes.
5. Wrap the decontaminated equipment in aluminum foil and store for next sample program.
6. Dispose of contaminated water and equipment in accordance with Federal/State Regulations.

## Appendix D

### **Sampling Event Checklist**

- \_\_\_\_\_ well surveys
- \_\_\_\_\_ permission forms
- \_\_\_\_\_ bottles
- \_\_\_\_\_ paperwork, chain-of-custody/ traffic reports
- \_\_\_\_\_ tags
- \_\_\_\_\_ custody seals
- \_\_\_\_\_ notebooks
- \_\_\_\_\_ DI water
- \_\_\_\_\_ Preservative (HCL, methanol chloride)
- \_\_\_\_\_ PH buffers
- \_\_\_\_\_ Filters for dissolved metals
- \_\_\_\_\_ Pipets/bulbs
- \_\_\_\_\_ Cups
- \_\_\_\_\_ Scoopula/handle/blades
- \_\_\_\_\_ pH meter
- \_\_\_\_\_ microtip/radiation detector
- \_\_\_\_\_ tyveks
- \_\_\_\_\_ gloves/inner/outer
- \_\_\_\_\_ buckets/brushes/sprayer/liquinox or alkanox
- \_\_\_\_\_ auger/shovel/pick
- \_\_\_\_\_ plastic sheets
- \_\_\_\_\_ bailers/rope
- \_\_\_\_\_ respirator
- \_\_\_\_\_ steel-toe/rubber boots
- \_\_\_\_\_ federal express forms
- \_\_\_\_\_ address labels/return address labels
- \_\_\_\_\_ coolers/ice/DOT placards
- \_\_\_\_\_ ziplock bags/ sandwich and gallon size for paperwork
- \_\_\_\_\_ whirlpacks
- \_\_\_\_\_ vermiculite
- \_\_\_\_\_ duct tape
- \_\_\_\_\_ clear tape
- \_\_\_\_\_ scissors/ utility knife
- \_\_\_\_\_ paper towels
- \_\_\_\_\_ garbage bags
- \_\_\_\_\_ camera/film
- \_\_\_\_\_ emergency phone numbers/cell phone
- \_\_\_\_\_ pagers/walkie talkies